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ENVIRONMENTAL LAW
SUPPLEMENTARY CASEBOOK AND MATERIALS

Prof. D. N. Dewees
Faculty of Law
University of Toronto

Fall, 2001

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TABLE 2

ESTIMATES OF US NATIONAL EMISSIONS TRENDS
(Millions of Tonnes per Year)

	1940	1950	1960	1970	1975	1980	1988	% Change 1970 - 88
Pollutant[a]								
Particulates	23.1	24.9	21.6	18.5	10.6	8.5	6.9	-63
Sulfur Dioxide	17.6	19.8	19.7	28.3	25.8	23.4	20.7	-27
Nitrogen Dioxide	6.9	9.4	13.0	18.5	19.5	20.9	19.8	+7
Volatile Organic Compounds	15.2	18.1	21.0	25.0	21.1	21.1	18.6	-26
Carbon Monoxide	82.6	87.6	89.7	101.4	84.8	79.6	62.2	-40
Lead[b]				203.8	147	70.6	7.6	-96
Economic Activity								
Population (10^6)[c]	132	152	181	205	216	228	246	+20
GNP $(10^{12}$ 1982\$)[d]	0.77	1.20	1.67	2.42	2.70	3.19	4.02	+66
Vehicle Miles [e]				1.1	1.3	1.5	2.0	+80
Fossil Fuel Use[f]			42.1	63.6	65.3	70.0	71.2	+12
Coal Use[f]			9.8	12.3	12.7	15.4	18.8	+53

[a] EPA, 1990, supra note 43, Table 1)

[b] Thousands of metric tonnes

[c] U.S. Bureau of the Census, Statistical Abstract of the United States 1990, 110th edition, (1990) at 7, millions.

[d] Ibid., p. 425. Trillions of 1982$

[e] Motor Vehicle Manufacturers Assoc. Facts and Figures, various years, trillions.

[f] U.S. Bureau of the Census, supra note [c], at 561, 10^{15} BTU's.

Physical Aspects of Pollution

Two types of pollutants

Degrading - harmful effect declines over time

BOD, bread in fish tank; particulates settle out; O2 removed.

Persistent (conservative) - harmful effect persists for years, centuries.

Hg, Pb, PCB, DDT

Environmentalists tend to worry more about conservative pollutants than degrading. This is reasonable since the harm from today's discharge occurs for decades into the future as well as today. Stream of future harm.

Two models of the environment

Stable - when disturbed, returns to original state if end disturbance.

Marble in bowl. Bread in fish tank. Selective logging of temperate forest (?)

Unstable - when disturbed, cannot prevent from moving to new state.

Marble on basketball. Clearcut rainforest - erosion, desert.

If you believe an ecosystem is unstable, you will worry more about today's pollution than if you think it is stable. This accounts for much of the variation in concerns about the environment.

Two types of harm

Reversible - if the pollution stops, the environment can be restored.

Bread in lake. Air pollution damage to forest.

Irreversible - if the pollution stops, the damage remains long time.

Dam on scenic gorge. Development of wetlands. Heavy metal pollution of soil. Genetic damage to species

Irreversible harm causes losses far into the future, so we should worry much more about it than about reversible harm. Take fewer risks with irreversible.

Irreversible damage is often associated with a persistent pollutant or with an unstable environment, but there are other reasons as well, such as development projects.

Two models of air and water movement

Mixed - uniform pollution concentration, discharge from any source same effect.

Air in Los Angeles basin, water in small lake.

Unmixed - varying pollution concentration, discharge from one source affects some receptors more than others.

Flowing stream; air on windy day; BOD in large lakes.

Choice of policies is significantly affected by whether the environment is mixed or unmixed.

Dewees, Donald N., "Hydro Restructuring and the Regulation of Conventional Pollutants" in Ron J. Daniels, ed. *Ontario Hydro at the Millenium* (Toronto: University of Toronto Press) 1996, pp. 173-178.

II. Review of Ontario Environmental Regulations

A. Air Pollutants

Any source of air or water pollution in Ontario would be subject to the Environmental Protection Act. Section 14.(1) of the EPA provides prohibits the discharge of a contaminant into the natural environment that "causes or is likely to cause an adverse effect". "Adverse effect" includes: impairment of the quality of the natural environment for any use that can be made of it; injury or damage to property or to plant or animal life; harm or material discomfort to any person; an adverse effect on the health of any person; and more. This general nuisance prohibition would apply equally to Ontario Hydro or any NUG. It protects the local environment near any source of pollution to the extent that the Crown can prove that the emission of the contaminant causes or is likely to cause harm given the rate of emission and the circumstances of the local environment.

Section 6 of the EPA prohibits the discharge of a contaminant in excess of the amount allowed in any regulation. Regulation 346, General - Air Pollution[1], includes another general nuisance prohibition in section 6. Section 5 of Regulation 346 prohibits any person from causing the concentration of a contaminant at a point of impingement to exceed the amount allowed in Schedule 1. Schedule 1 lists a number of contaminants and the allowable concentration for each. See Table 2. A point of impingement is any point at which the air pollution might cause harm, generally taken to be ground level near the property line. Because the offence is causing the concentration to exceed the limit, this section could be interpreted to require each polluter to take the environment as it finds it. If several polluters contribute to a concentration exceeding the limit, each might be charged even though the emissions of each alone would not exceed the limit. In fact, however, the Ministry determines compliance with this regulation by estimating the concentration in the air using air pollution dispersion models, and considering only the source in question. Thus these limitations are enforceable as emission limits. They apply equally to Ontario Hydro and to any NUG.

The MOEE has established guidelines for ambient air quality with respect to a much larger number of contaminants than are listed in Schedule I. These include point of impingement standards based on half hour averages and 24-hour averages. See Table 2. In general these guidelines add little to the limits of Schedule I, with respect to electricity generation.

Regulation 346 section 12 limits the emission from incinerators of organic matter having a carbon content, expressed as equivalent methane greater than 100 ppm by volume, and would probably apply to a watts-from-waste plant that might generate electricity. Any co-generation facility that will incinerate wastes or will generate wastes requires approval under EPA Regulation 347, section 12. New incinerators have been banned under section 12.1 since 1992.

In addition to these regulations and guidelines of general application, there are more specific regulations of air pollution that might arise from thermal electricity generation. The Countdown Acid Rain Program produced four regulations of sulphur dioxide emissions from four corporate sources in Ontario: Algoma[2], Inco[3], Falconbridge[4] and Hydro[5]. The portions of these regulations that apply after 1994 are reproduced in Appendix A. Each specifies a total annual limit on the discharge of sulphur dioxide from the subject corporation. Ontario Hydro is limited to 175,000 tonnes per year of sulphur dioxide. In addition, the Ontario Hydro regulation limits the sum of sulphur dioxide and nitric oxide emissions to 215,000 tonnes, requiring some control of nitric oxide, but allowing a trade-off with sulphur dioxide.

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[1] R.R.O. 1990, Reg. 346.

The Countdown regulations for Algoma, Inco and Falconbridge specify limits for total sulphur dioxide emissions from the sinter complex or smelter complex. If electricity were generated at any of these sites, any emissions of sulphur dioxide arising from that generation activity might or might not have to comply with the total emission limit in the regulation depending on whether the generation facility was considered part of the "complex"..

In 1994, the MOEE adopted air pollution emission guidelines for stationary combustion turbines.[6] These would apply to any new combustion turbine generator installed after November, 1994, and to large turbines installed after June, 1994. The guidelines limit NOX, carbon monoxide and sulphur dioxide emissions all in relation to the power output of the turbine. The NOX limit is derived by multiplying a factor by the power output of the combustion turbine and adding the product of another factor times the heat output that is recovered from the combustion turbine.[7] The limit is enforced by measuring the concentration of NOX in the exhaust gas and calculating the allowable concentration based on the factors in the regulation. This regulation, which is referred to as a new source performance standard, allows considerably greater NOX emissions per unit of power output for small turbines than for large turbines, presumably because control costs are higher for small turbines. The regulation also provides greater emission limits for liquid fuel turbines than for natural gas turbines. Carbon monoxide is limited to 60 ppm by volume in the exhaust gas and sulphur dioxide is limited to 800 grams per gigajoule of useful energy output. This regulation does not distinguish between Ontario Hydro and NUG's.

There are also specific regulations for particular activities or industries. Regulation 338 Boilers Regulation applies to boilers not operated by Ontario Hydro that are put into operation after 1986 or that have made changes that might increase sulphur dioxide emissions.[8] Section 3(1) prohibits the use of fuel oil or coal with a sulphur content exceeding 1 percent unless the emissions are no more than if the fuel sulphur content did not exceed 1 percent. Section 3(3) prohibits the use of fuel that would result in a wet sulphate deposition exceeding 0.1 kg/hectare/year from sources north of a line between approximately Collingwood to Perth Road (north of Kingston), up to 50 degrees north latitude.

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[2] Algoma Sinter Operation - 1986/94, O.Reg. 663/85.

[3] Inco Sudbury Smelter Complex - 1994, O.Reg. 660/85.

[4] Falconbridge Smelter Complex - 1994, O.Reg. 661/85.

[5] Ontario Hydro, R.R.O. 1990, Reg. 355.

[6] Ontario Ministry of Environment and Energy," Guidelines for Emission Limits for Stationary Combustion Turbines", Toronto: MOEE, March, 1994.

[7] For natural gas fired turbines, the power output factor, measured in grams per gigajoule, is 600, 240, 140 for turbines less than 3 megawatts, 3-20 megawatts, and over 20 megawatts respectively. The factor for peaking turbines over 3 megawatts is 280. Factors approximately twice as large are applied to liquid fuel turbines.

There are Federal guidelines for thermal generating stations. The current version of these guidelines is reproduced in Table 3. The MOEE would apply these guidelines in any application for a new generation source in Ontario. In general these are less restrictive than the applicable Ontario regulations.

CO2 discharges are not regulated in Ontario. However Ontario has adopted a management strategy for greenhouse gas emissions which state two objectives: to reduce the carbon intensity of energy supplied by Ontario Hydro by 5 percent between 1990 and 2000; and to stabilize Ontario Hydro's net greenhouse gas emissions at 1990 levels by the year 2000 and to reduce them 10 percent by 2005.[9] Whether this commitment would survive a restructuring of Ontario Hydro is questionable. In any event, there is no reason to expect NUGs to make a similar commitment.

B. Other Pollutants

The discharge of water pollution is controlled by section 14 of the Ontario EPA, by the Ontario Water Resources Act[10], particularly section 30, by control orders and program approvals with individual sources, and by regulations adopted under MISA, the Municipal Industrial Strategy for Abatement. MISA has developed separate regulations for each of nine major industrial sectors. One of these, Effluent Monitoring and Effluent Limits - Electric Power Generation Sector[11], applies explicitly to named existing Ontario Hydro generating stations. Section 16 prohibits discharges that exceed daily and monthly average concentration limits specified in schedules 2 and 3. Schedules 2 and 3 specify concentration limits for a set of water pollutants for about a dozen different effluent streams from each of the generating stations. In general, the concentration of a pollutant allowed in a specific effluent stream is the same for all generating stations. Table 4 presents a typical entry in schedule 2, the limits applicable to the R.L. Hearn generating station. Section 16 limits the ph of discharge water to the range 6.0 to 6.9 for any sample and any stream. I understand that compliance with these MISA regulations will be costly for Ontario Hydro, particularly the oil and grease limitations.

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[8] Boilers, R.R.O. 1990, Reg. 338.

[9] "Management Strategy for Greenhouse Gas Emissions", January 16, 1995, recommendation by J.R. Burpee, General Manager, Fossil, submitted to the Board of Directors by the President and the Chairman, approved by the Board of Directors of Ontario Hydro in January, 1995.

[10] R.S.O. 1990, c. O.40.

[11] O. Reg 215/95.

What water pollution regulation would face a NUG? There is no generic NUG regulation, so MISA would only apply if the NUG was a member of a listed industry. The pulp and paper industry and the petroleum refining industry are possible NUG's and each is covered by a MISA regulation. Taking the pulp and paper regulation as an example, section 3.(1) states that the regulation applies to plants listed in a schedule, implying that it applies to the entire plant and therefore to any boiler or generation facility that was an integral part of the plant. Section 14.(1) prohibits daily discharges that exceed the daily plant loading limits set out in Schedule 2 and Section 12.(3) prohibits monthly average discharges that exceed the monthly average loading limits in Schedule 2. Sections 14.(5), (6) and (7) limits the allowable concentration of dioxin in the effluent, and section 14.(8) limits the ph of the waste water to the range of 6.0 to 9.5. Section 15 provides that after 1995, the plant may calculate new plant loading limits by determining the ratio of actual production over the last three years to the reference production rate published in Schedule 4 of the regulation, allowing emissions to increase if output increases and requiring it to decrease if output decreases. Section 16 requires that the effluent from any of the streams not cause more than 50% mortality to fish placed in 100% effluent. Table 5 presents a typical entry in Schedule 2, the effluent limits for the Canadian Pacific Forest Products mill in Thunder Bay. The petroleum sector MISA regulation[12] is similar to that of the pulp and paper sector, specifying daily and average monthly plant loading limits for each plant and adjusting these over time based on actual production compared to the reference production rate.

There is a fundamental difference between the MISA regulation that applies to Ontario Hydro and those applying to other industries. The Hydro regulation limits the concentration of pollutants in the effluent stream, while the other regulations limit the total discharge of pollutants in kilograms per day and per month, using factors that were calculated based on the output of each plant. On the one hand, each of these regulations limits pollution discharge in relationship to output, so that if production increases, the allowed discharge should increase, presuming that the effluent flows at a hydro plant are proportional to electricity generated. But on the other hand Ontario Hydro may discharge more pollutant if it increases the water flow in a waste stream. It is not obvious whether Hydro has much choice about the volume of these waste flows, but if so, it has added flexibility in the amount of pollution it may discharge. Because the other regulations tie the allowable effluent to the output of product, installing some co-generation capacity would not increase production output at all and would not increase allowable pollutant discharge. Thus any installation of co-generation capacity by the pulp and paper industry or the petroleum refining industry would require an emission control strategy that did not allow increase water pollution discharges beyond the pre-existing effluent limits. In this respect, the MISA regulations are more restrictive for NUG's than for Hydro.

If the NUG was not in a MISA sector, it would be covered by regulations of general application. And whether or not the NUG was in a MISA sector, it would be covered by the general provisions of the Ontario Water Resources Act[13]. The Act provides in section 30 that any person that discharges any material into any water that impairs the quality of the water is guilty of an offence, while section 28 deems the water to be impaired if the material causes or may cause injury to any person, animal, bird, or other living thing. This legislation would appear to be neutral in its application to Hydro and any NUG. Because the test is whether the discharge may cause harm, it would appear to favour small sources over large sources, simply because it is easier to detect materials in amounts that might cause harm when the volume of the discharge is large.

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[12] Effluent Monitoring and Effluent Limits - Petroleum Sector O. Reg. 537/93.

[13] R.S.O. 1990, c. O.40.

In the case of a NUG located in an urban area, such as a hospital, university or other non-industrial commercial operation, it would likely discharge its water waste into the local sewers and would be subject to the municipal sewer by-law, if any. It seems unlikely that this would be more restrictive than the law applicable to discharges directly into the natural environment. Whether there would be some advantage to a small generating plant discharging water into the municipal sewer system is unclear.

TABLE 2
UTILITY AIR EMISSIONS AND ONTARIO REGULATIONS

POLLUTANTS	SOURCE		ONTARIO LIMITS (½ hour average)	
	Coal, Oil	Gas	SCHEDULE I ($\mu g/m^3$)	OTHER[1] ($\mu g/m^3$)
SOX	✓		830	
PM	✓		100	
NOX	✓	✓	500	
VOC	✓	✓		
CO2	✓	✓	–	
Arsenic	✓			1
Arsine	✓		10	10
Beryllium	✓		0.03	
Cadmium	✓		5.0	
Chromium	✓		–	5
Copper	✓		100	
Formaldehyde	✓		65	
Lead	✓		10	
Manganese	✓		–	7.5
Mercury	✓		5	
Nickel	✓		5	

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[1] Appendix 10, "Summary of Point of Impingement Standards, Ambient Air Quality Criteria (AAQCs) and Approvals Screening Levels (ASL's)" in Table 1 "General Information: Certificates of Approval, Section 9, Environmental Protection Act", Toronto, MOE, August, 1992.

TABLE 3
FEDERAL THERMAL POWER GENERATION EMISSIONS GUIDELINES[1]

Pollutant	**Fuel**	**Limit** (720 hour average)
NO2	Coal	258 ng/J
	Oil	129 ng/J
	Gas	86 ng/J
PM	All fuels	43 ng/J
SO2	Coal, oil:	
	258-2580 ng/J uncontrolled	258 ng/J
	>2580 ng/J uncontrolled	90% control

Notes: ng = nanogram
J = joule

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[1] Thermal Power Generation Emissions National Guidelines for New Stationary Sources, P.C. 1990-333, section 4.

TABLE 4
MISA: ELECTRIC POWER GENERATION SECTOR

SHEDULE 2 R.L. HEARN TGS					
ATG	**Parameter**	**Types of Non-Event Process Effluent Stream**	**Monitoring Frequency**	**Daily Concentration Limit mg/L**	**Monthly Average Concentration Limit mg/L**
	Column 1	**Column 2**	**Column 3**	**Column 4**	**Column 5**
8	Total Suspended Solids	ATWE	D	70.0	25.0
		WTPE	D	70.0	25.0
9	Aluminum	ATWE	W	13.0	4.50
		WTPE	W	13.0	4.50
9a	Iron	ATWE	W	2.50	1.0
		WTPE	W	2.50	1.0
25	Oil and Grease	OWSE	W	29.0	13.0

Explanatory notes:

Types of Non-Event Process Effluent Streams:

ATWE = Ash Transport Water
WTPE = Water Treatment Plant
OWSE = Oily Water Separation
ATG Analytical Test Group
mg/L Milligrams per Litre
D Daily monitoring requirement
W Weekly monitoring requirement

Source: O. Reg 215/95 Effluent Monitoring and Effluent Limits - Electric Power Generation Sector, Schedule 2, page 0.

TABLE 5
MISA: PULP AND PAPER SECTOR

CANADIAN PACIFIC FOREST PRODUCTS, THUNDER BAY

ATG	Parameter		Monitoring Frequency	Daily Plant Loading Limit kg/Day	Monthly Average Plant Loading Limit kg/Day
	Column 1		Column 2	Column 3	Column 4
1A	Biochemical Oxygen Demand (5 day)		D	28400	14200
6	Total Phosphorus		W	796	483
8	Total Suspended Solids (TSS)		D	38100	22400
16	Chloroform		W	10.6	5.34
17	Toluene		W	0.611	0.611
20	Phenol		W	1.17	1.17
33	Adsorbable Organic Halide	- Phase-one	W	4670	3620
		- Phase-two	W	2800	2170
		- Phase-three	W	1490	1160
24	2,3,7,8-Tetrachlorodibenzo-para-dioxin		Q		
	2,3,7,8-Tetrachlorodibenzofuran		Q		
	TEQ		Q		

Explanatory notes:

D = Daily monitoring requirement
W = Weekly monitoring requirement
Q = Quarterly monitoring requirement
ATG = Analytical Test Group
kg/day = Kilograms per Day
TEQ = Total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners

Source: O. Reg 760/93 Effluent Monitoring and Effluent Limits - Pulp and Paper Sector.

8 THE GLOBE AND MAIL, THURSDAY, JULY 24, 1980

Bathing not stopped until a day after spill

By GWEN SMITH

Beaches in the Barrie area were not closed to swimming until Tuesday morning despite the fact that one million gallons of raw sewage started pouring into Lake Simcoe 32 hours earlier, at 1:30 a.m. Monday.

"People were still swimming in the area at the time," Bill Straughan, Barrie's director of health inspection, said yesterday.

Neil Embree, of the Ministry of the Environment in Barrie, said neither his ministry nor city officials told the health unit, which is responsible for closing beaches, of the discharge because there was a furor trying to get equipment working again. "It was an oversight," he said.

Public works employees directed the sewage flow to an old outfall at Kempenfelt Bay for 19 hours after a storm caused flooding and the breakdown of a pump at the Barrie sewage treatment plant. A diesel engine on the sewage pump kicks in during power failures but it also broke down, Mr. Embree said. Its battery was burned out by electric power surging off and on.

"We're disturbed that two agencies knew about problems and didn't tell us," Mr. Straughan said. Soon after the health inspector learned of the sewage dumping, city officials agreed to post signs closing the beaches.

Mr. Straughan said water about a mile across the bay was contaminated. Allendale and Centennial Park beaches will remain closed for an indefinite number of days until winds flush the sewage farther out into the bay.

Discharges are dangerous to the public because of the great number of waterborne diseases caused by sewage bacteria, Mr. Straughan said.

He said a dozen water samples taken by the Ministry of Health showed the heaviest contamination at Allendale Beach. Total coliform bacteria counts there were 65,000 in 100 millilitres of water. A count of 1,000 is the legal maximum.

No unusual illnesses have been reported in the area since the discharge, he said.

Mr. Embree said there was no choice except to send the sewage out into the lake. He said Barrie and environment officials haven't had time to consider whether changes would be made to the backup system or whether another area would be set aside for future emergency discharges.

The city tried to eliminate bacteria in the effluent by adding chlorine as the sewage poured out. "But that is only a surface kill," Mr. Straughan said. "When it breaks up in the bay, it's still raw sewage."